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The role of European governments in the digital economy

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The Role of European Governments in the Digital Economy

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What is the role of government in the digital economy? It is not our intention to go into an in-depth ideological debate on whether governments should intervene in the business sector. We will try to adopt a pragmatic approach and explore what already happens in practice. It is up to the reader to make a judgment to what extent the governments should be involved in the ICT sector. There is enough indication that, due to network externality effects, governments need to take on an active role in stimulating an e-environment to jump-start the move toward a higher level of e-readiness.

In this chapter, we will argue that the government can play an important role in at least four areas: stimulating the enhancement of the infrastructure that enables e-Europe; investing in improved services (e-government); stimulating an e-friendly business environment; and creating an all-inclusive information society. For each of these areas we will provide insights into how the government can play an effective role[1].

4.1 Stimulating the Infrastructure that Enables a Vigorous e-World

An effective e-Europe needs to have a basic infrastructure in place in order to reach out to its citizens or to provide a robust network over which business can operate. Waiting for the private sector to build this infrastructure all alone will not work, or will suffer from serious delays because of the network externalities that create a serious hurdle for any private firm wanting to start with investments in the ICT infrastructure.

An important focal point of the successful IT policies in Sweden, Denmark and Belgium, for example, has been the establishment of dense broadband

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[1] This chapter is partially based on De Meyer, A. and Loh, C., (2004), *Impact of ICT on government innovation policy: an international comparison,* International Journal of Internet and Entreprise Management, vol 2, no 1.

telecommunications networks linking the entire country. The principle is that the government is responsible for ensuring that this infrastructure is available throughout the country, while broadband expansion should be left primarily to market players.

This basic infrastructure also needs to be accessible at reasonable rates. The study reported in this book shows clearly that a country's e-readiness is to a large extent determined by the combination of broadband penetration (DSL and other forms of broadband) and low access costs.

A good infrastructure needs more than the hard component, however: There is also a soft side to it. This soft side involves stimulating creative research and development in the field of ICT. It also requires the construction of networks between research institutes, universities, and industry players, where each supports the others in the technological innovation process, as well as the creation of an information and communications infrastructure. As Valtonen[2] puts it, the ability to transfer new and existing knowledge to the right place at the right time in order to transform it into a marketable product or service is one of the key issues for the business world in today's technology-savvy and knowledge-intensive environment. Networks play a very important role in enabling this transfer.

Research and the presence of technological networks between the business community, universities, and research and information centers can facilitate the technological innovation process by building on the strengths of each and creating synergies. From the examples provided by what countries like Finland and Ireland do, networks operate mainly on two levels: (a) a more *micro* level, where collaboration may be in specific sectors or industries; and (b) a more *macro* level, where complementary resources are pooled for a designated area.

An example of the second form of collaboration are the Finnish centers of expertise. These centers of expertise pooled complementary research resources in designated areas and became catalysts in the innovation process. Launched by the Finnish Ministry of the Interior in 1994, the objective of Finland's centers of expertise program was to improve the conditions that enable the location and development of internationally competitive, knowledge-intensive business enterprises. Instead of supporting weak ar-

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[2] Valtonen, M. (1999), *The Role of the Regional Centres of Expertise in Business Networks*, editors: Gerd Schienstock and Osmo Kuusi, Transformation Towards A Learning Economy: The Challenge for the Finnish Innovation System, SITRA, pp. 284-91.

eas, the strategy is to focus on and further develop regional strengths. The 11 regional centers of expertise thus act as a catalyst in enhancing the links and cooperation between universities, research institutions, enterprises and regional authorities.

Another example of how one can create such networks, this time perhaps more at the micro level, is the establishment of *virtual* information centers such as the Swedish site *itsweden.com*. This website focuses on the IT sector in Sweden, including the country's venture capital and e-learning industries[3].

4.2 Investing in Improved Services: e-Government

Having stimulated the development of infrastructure, governments need to improve the services they provide to citizens and business by going online. As Leitner[4] points out in her evaluation of e-government in Europe based on the *e*Europe Awards Program, e-government has reached a turning point in Europe. The question is no longer simply whether to go online or not. Data sharing and back-office integration already offer substantial benefits to governments all over Europe. Now, however, e-government is increasingly being regarded as a key enabler for citizen-centric, cooperative, seamless and polycentric modern government.

Since the government has the one of the largest client bases, and all citizens and businesses are at some point customers of the government, the public sector can serve as a leveraging platform to demonstrate how ICT can improve living standards. In doing so, it can create a *demand* for ICT. At the same time, the development of electronic government can also create a *market* for ICT applications developed by private-sector firms and thereby stimulate the development of the ICT industry.

However, in order to become a truly meaningful agent of modernization and change, governments will have to replace the still-prevalent technology bias with a focus on socio-cultural transformation.

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[3] This website was set up jointly by the Ministry of Foreign Affairs Sweden, the Swedish Trade Council, the Association of the Swedish IT and Telecom Industry, the Invest in Sweden Agency, and the Swedish Office of Science and Technology. See http://www.itsweden.com/.

[4] Leitner, C. 2004, eGovernment in Europe: the State of Affairs, Eipascope, www.eipa.nl.

Being still a relatively new concept, e-government is often something of a misnomer insofar as people believe an agency has an e-government strategy if it has a government website. As with business IT strategies, it entails much more than that. In essence, e-government is really about examining the entire government strategy model to see how government agencies can work together more effectively and efficiently, using ICT to add value to customer relations with the government. This process has been explicitly outlined by the World Bank, which defines an e-government as one that *leverages the use of ICT to transform relations* with citizens, businesses and other government agencies. Better delivery of government services to citizens, improved interaction with businesses, citizen empowerment through increased access to information, and more efficient government management lead directly to the potential rewards of e-government: reduced corruption, greater transparency and convenience, revenue growth and/or cost reductions. These rewards will accrue not only to businesses and citizens but also to the overall government sector.

In general, the development of an e-government can be categorized into two main thrusts. The first is to move information and appropriate services online, the objective of which is to create a "24/7 government" and enable greater convenience in citizen-government or business-government communications. This typically progresses from posting information online to fostering greater interactivity to implementing transactional capabilities. The sequence, in other words, is *publish* → *interact* → *transact*[5], where the value created increases exponentially. This publish–interact–transact model is similar to the ICDT model developed by Angehrn[6], where I-C-D-T stood for Information, Communication, Distribution and Transaction. This ICDT model is generic and can be used in a variety of sectors.

The second thrust is to develop an ICT-enabled public sector workforce that can work efficiently in the new knowledge-intensive environment. This entails strong top leadership commitment to the development of an e-government. At the rank and file level, public sector workers should be equipped with knowledge management and ICT skills, as the strategy of maximizing automation will minimize direct face-to-face contact and will shift their roles from labor-intensive to knowledge-intensive.

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[5] Accenture (2001), Rhetoric vs Reality: Closing the Gap, eG*overnment Leadership*, April.

[6] Angehrn, A.A. (1997), "Designing Mature Internet Strategies: The ICDT Model," *European Management Journal*, vol. 15, no. 4, pp. 335-474.

We have identified the crucial pillars of an e-government strategy as: (a) a clear e-government vision and prompt installation of delivery mechanisms; (b) putting in place interactive capabilities, moving from mainly *publishing* information to creating a portal that provides integrated and client-centric services ("*interact*"); (c) developing and enhancing secure transactional capabilities through public key infrastructures (PKIs), to progress from one-way informational flows to bilateral and transactional flows ("*transact*"); and (d) cultivating knowledge workers in the public sector. These four aspects, as illustrated in figure 1 (see below), form the structure of the discussion that follows.

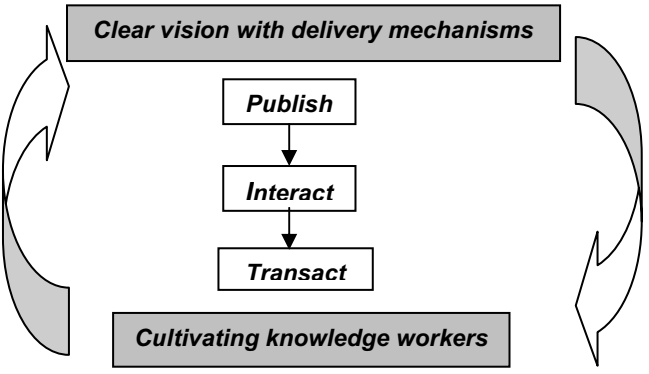

Fig. 1: E-government strategy

4.2.1 The Vision of e-Government and Its Implementation

The first step in an e-government strategy is to develop a broad e-government vision and put in place responsibility centers and mechanisms to ensure delivery accountability. Leading e-governments have, in their e-government visions, articulated the role of the public sector as a *catalyst* in creating an information economy and the need for seamless one-stop access to citizen-centric government services. In particular, leading e-governments such as those in Denmark, the United Kingdom and Finland have stressed the importance of four focal areas: service to *individuals*; service to *businesses*; *intergovernmental affairs*; and *internal efficiency and effectiveness*. At the same time, it is also vital that government leaders pass down their e-government vision to the middle management and ensure that the general public sector workforce understands the "why" and "what" of change.

Implementation mechanisms include the formulation of a well-defined action plan. This often requires the creation of an *intergovernmental* agency or a strong coordinator to oversee the implementation process. As articulated in the e-Norway Action Plan, an e-government action plan should be a clearly defined operational plan that describes *where* the country is at, *what* needs to be done, *who* is responsible and by *when* actions are to be implemented. Also, an e-government strategy should be an *agency-based* one. This means that the relevant government agencies should be made responsible for identifying which services are "appropriate" for electronic delivery and in what sequence and manner. To help agencies decide, it is also useful to provide some guidelines on the criteria that should be used. However, the important thing is for agencies to ensure that the major back-end systems and processes are in place to fully realize the benefits of going online.

Having a vision does not mean that everything has to be feasible. E-government programs are expensive and their financial returns have thus far been limited. Funding such partnerships is therefore a demanding task. Public-private partnerships may offer an opportunity for funding as well as for collaborative development. Pooling resources across different agencies is an important tool for allocating funds effectively. The Belgian Crossroads Bank for Social Security that ties together public institutions at different government levels with the private sector is an interesting example of this integration and pooling of resources[7]. This e-government approach in the Belgian social security sector is mentioned as best practice in the most recent benchmarking study ordered by the European Commission. Let us look at it as a short case study, because it illustrates well some of the points we made earlier about vision, the pooling of resources and the need for a coordinating agency.

Like many social security systems throughout Europe, Belgian social security is a complex mechanism. It consists of three types of insured groups (employees, self-employed persons and civil servants). It covers a maximum of seven different social risks, e.g. incapacity for work, industrial accidents, occupational diseases, unemployment, etc. And it spans four assistance systems, e.g. subsidies for the handicapped, guaranteed family allowances, minimum incomes and income guarantees for the elderly. In total, about 2,000 institutions are responsible for implementing the Belgian social security system. Close to 10,000,000 socially insured persons and 200,000 employers have very regular contacts with these institutions.

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[7] http://ksz-bcss.fgov.be. Crossroads Bank for Social Security.

15 years ago, an in-depth analysis of the operations of this system showed that the business processes of the social security institutions was not customer-oriented and was certainly not harmonized across the different social security institutions. Each institution had its own set of paper forms with accompanying instructions. The institutions very often asked insured persons and their employers for information that was already available on paper at another social security institution. The customers therefore had to retrieve and supply this paper, instead of having the institutions exchange this information directly between themselves.

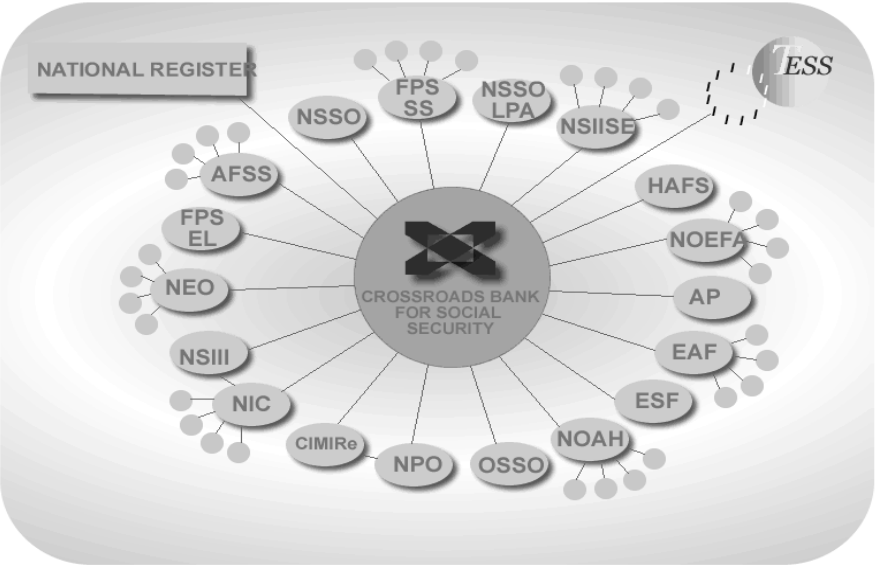


Fig. 2: The Belgian Crossroads Bank for Social Security (source: CBSS website)

To improve service delivery to socially insured individuals and companies, and to resolve the above mentioned shortcomings, the Crossroads Bank for Social Security (CBSS) was created 14 years ago (figure 2).

The mission of the CBSS was to be the engine of e-government in the social security sector. Based on a common vision, the actors in the Belgian social security sector benefited from new technologies that let them improve and radically reorganize their mutual relationships and processes, and this in such a way that privacy was absolutely guaranteed.

The introduction of this system is regarded as a considerable success. In the past, insured persons or their employers had to get about 170 paper cer-

tificates from one social security institution, only to hand them over to another social security institution. These paper certificates have now been eliminated and replaced by direct electronic data exchange between the relevant social security institutions. In 2003, 339 million such items of data were exchanged electronically. Some 50 types of forms previously required by the social security system have been eliminated. Insured persons and their employers can now submit all their social security data on the basis of a single form and uniform set of instructions. They only have to report each item of data once to the entire social security apparatus. The number of contacts between insured persons and their employers on the one hand and social security on the other has been reduced drastically. Hospitals and pharmacists no longer have to encode about 100 million paper certificates a year concerning insurance statuses in the healthcare sector. Now, they can read this information electronically on the social security card.

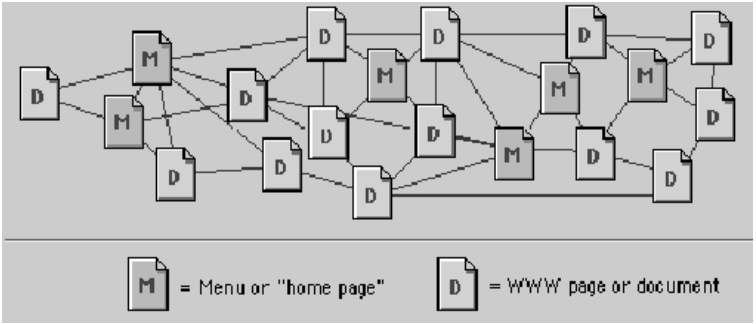
The quantitative benefits in this case are considerable, which is not always the case. In determining a successful e-government strategy any agency will have to determine its priorities. Since e-government is so expensive, cost/benefit analyses will become a prerequisite. In these analyses, qualitative criteria such as the range of channels through which a service can be accessed, the variety of services offered, a reduction in the actual or perceived wait time for users, better accountability, greater openness, transparency, and improvements in the quality of life of vulnerable user groups may still play an important role.

4.2.2 Putting in Place Interactive Capabilities: From Publishing to Interaction

The second step in an e-government strategy is to progress from a passive online government information directory ("*publish*") to the creation of a web *portal* that operates as a "one-stop shop" that provides *interactive*, *user-centric* and *integrated* government services ("*interact*").

At the *publish* level, government websites should have a logical and systematic structure (see figure 3). Like corporate websites, two key success factors are a single point of "official" access and a coordinated framework for linking the available information. Specifically, the structure should encompass (a) a master government home page for accessing all government information that is available online; (b) consistent formats, links and functions; (c) a logical structure that users can click through easily to obtain the required information; and (d) quality assurance for the information available and for all organizations and agencies linked to the site.

Example of an *unstructured* website



Example of a *highly structured* website

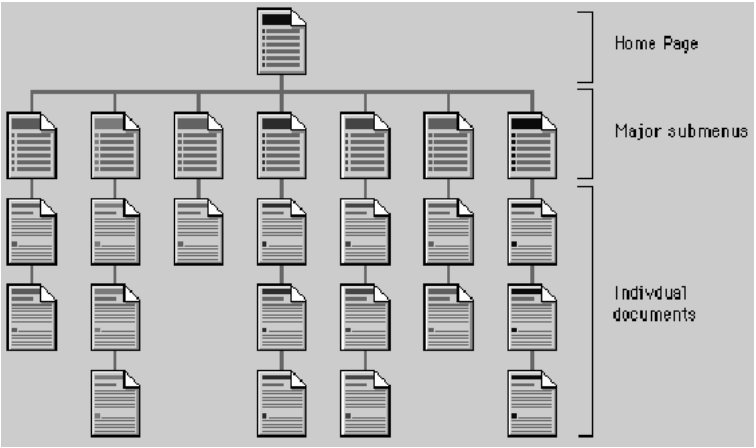


Fig. 3: DeConti, L. (1998), "Planning and Creating a Government Web Site: Learning from the Experience of U.S. States", *Information Systems for Public Sector Management*, Working Paper Series, paper no. 2, July, Institute for Development for Policy and Management, University of Manchester, UK http://www.man.ac.uk/idpm/idpm_dp.htm - isps_wp

In the area of integrated and citizen-centric online deliverables, the Irish government's OASIS portal and the site operated by the Flemish government in Belgium are good examples of citizen-centric and integrated G-to-C services. Based on the "life events" approach, information and services are integrated into *multi-agency* packages and organized around a typical

citizen's needs from birth to death, such as "Register Birth", "Move House" and "Get Married"[8].

In delivering G-to-B services, the sharing of information is an essential underpinning element to allow the "one-stop shop" concept to be implemented across all government agencies. It is important for governments to realize that, in the information economy, it is very inefficient to make businesses provide the same information to various agencies. They must therefore identify *which* agencies need *what* information and *in what order* to accomplish basic tasks. Businesses do not distinguish between government agencies: They see agencies collectively as "the government". The aim of a G-to-B portal should therefore be to create a seamless and "intelligent" web portal, where a business need not know which agencies are responsible for a given transaction. It should only have to submit basic information once, whereupon all the affected state agencies' records will be updated.

The Irish G-to-B portal, known as BASIS (Business Access to State Information and Services)[9], provides business-centric government services based on the key "life events" of a typical business. On this site, key business activities are grouped into twelve main "events" based on growth (lifecycle) phases, key functional categories, and service categories. The virtual customs office of the Swedish government[10] offers another interesting example of a site that is organized along the logic that a business user would follow in approaching a customs officer.

Another aspect of integrated government deliverables is the development of a "single identifier", which, as articulated by the Irish government, identifies and verifies users and streamlines all their dealings with the government. Identifiers range from more "offline" processes that are relatively easy to implement, such as the Irish Personal Public Service Number developed as a single citizen identifier, to more "online" processes that can more effectively ensure security and safeguard authentication of user identity through the implementation of a PKI framework.

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[8] See www.gov.oasis.ie and www.vlaanderen.be.
[9] www.basis.ie.
[10] www.tullverket.se.

4.2.3 Enhancing Transactional Capabilities

A common problem among many e-government applications is that, of the services that are currently available online, a large proportion involve the provision of relatively static and *one-way* information flows. Because most information transmitted via ICT to government agencies is private and confidential, and because online transactions with the government often require some form of authentication and integrity checks, the government web portal must continuously improve secure transactional capabilities to encourage bilateral informational flows.

To do so, a form of public key infrastructure (PKI) has been implemented by most European government agencies. This requires a mature e-commerce platform that addresses the four key elements of a PKI: authentication, non-repudiation, confidentiality and integrity.

Among the key success factors of PKI implementation, the most important is that it remains a collaborative effort with the private sector. Also, the diffusion of information about PKIs and the level of public awareness about them should be emphasized. The latter aspect is especially important, as it determines public confidence in the security of online transactions with the government.

This becomes very important in the implementation of online tax returns, for example. A recent survey of e-government in Europe[11] reported that the usage of such a service in Europe ranged from 5-10 percent up to 35 percent for the leading governments. It is interesting to observe that the average user reported a saving of 71 minutes, representing more than seven million hours in 2003. According to service providers, the maximum take-up could be as high as 80-90 percent, indicating a potential benefit of more than 100 million hours per year for EU citizens. However, this will work only if citizens trust the service and consider it to be user-friendly. This will require a reliable system of providing electronic certificates that enable secure authentication, for instance. An excellent example of an integrated portal for e-government transactions, security and legally binding electronic signatures is the Bremen Online Service in Germany, another 2003 *e*Europe Awards winner.

As a backbone, the creation of a secure and predictable environment for online transactions between the government and its clients requires a

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[11] Ramboll Management, 2004, Top of the Web, User satisfaction and usage survey of eGovernment services, www.europa.eu.int/eeurope.

strong supporting legal framework. The *directive on electronic signatures* is now in force in the EU and is gradually being implemented by the various member countries.

4.2.4 Equipping Knowledge Workers

E-government requires public sector employees to become knowledge workers in the digital economy. Since ICT is merely a tool for the government to improve its relationships with its clients, public sector employees must be equipped with both management skills and the skills to use ICT if they are to fully exploit their potential. Putting computers on the desks of civil servants will not make a country a thinking society if the people in front of the computers keep on thinking in the same old way. The challenge is therefore to have a workforce that is capable of using ICT to design, develop, and deliver citizen-centric government services. What is also needed is a leadership that can set an example by applying ICT to respond to the needs of citizens and businesses. The continued development of knowledge workers in the public sector will be the backbone of the whole e-government strategy. At the 2003 European e-government conference in Como, Italy[12], many speakers stressed that (re)training staff, changing approaches to management and redefining tasks and practices are essential to the successful implementation of e-government. This will require a significant investment in the reorganization of the public sector and in the skills of its employees.

4.2.5 Lessons Already Learned

In her analysis of the 2003 *e*Europe Awards, Leitner[13] made a number of interesting observations on what we have already learned about the implementation of e-government. It is good to celebrate successes from time to time. The lessons learned can be summarized as follows:

- The 357 cases she studied show a society that is undergoing a true revolution and evolution in basic government structures, cutting through red tape and bureaucracy. Modernization and good governance are the order of the day,

[12] http://europa.eu.int/information_society/egovconf.
[13] Leitner C., 2004, op.cit.

- There is a clear trend to remove command and control from the top and replace it with people-centric, responsive and flexible structures that meet the real needs of society,
- There are vast differences across Europe in terms of capabilities, but also in terms of the needs of citizens. E-government is sometimes about highly localized and specific solutions,
- In the process of implementing e-government, governments have learned a lot about change management,
- Collaboration between the private sector and the different levels of government is increasing. This paves the way to more integrated solutions,
- There is a growing interest in cross-border and pan-European cooperation and service provision. Many projects are delivered in multiple languages, sometimes particularly targeting visitors, sometimes reflecting the multicultural aspects of cities and regions, sometimes simply reflecting the trend toward mobility in Europe.

4.3 Creating an e-Friendly Business Environment

In the internationalizing knowledge-based economy, tax incentives and subsidies are no longer a very effective way for countries to encourage technological innovation and attract hi-tech and knowledge-intensive firms to their shores. More than ever, these decisions are increasingly based on a complex mix of soft factors (such as knowledge resources, work ethics and the regulatory environment) and hard physical infrastructure, such as technology and communications. Based on the "best practices" of leading innovative countries such as the United States, Sweden, Finland, Singapore, Israel and Japan, we have developed a framework to assess how public policy can be designed to encourage technological innovation and facilitate knowledge transfer in the private sector. The six strategic thrusts of our framework are identified in figure 4. We apply them to show how an e-friendly business environment can be created.

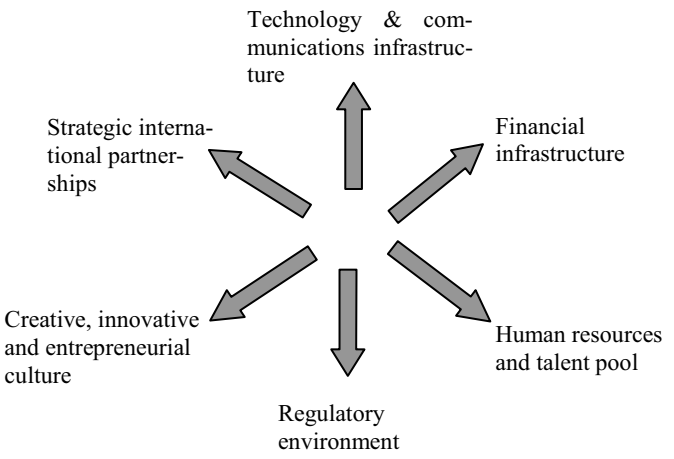

Fig. 4: Components of a government's innovation policy

4.3.1 Technology and Communications Infrastructure

We have already referred to the need to stimulate the creation of an effective infrastructure, both hard and soft. Such a high-performance, accessible technical infrastructure is a *sine qua non* to be successful.

4.3.2 Financial Infrastructure

A well-developed financial infrastructure is critical to the creation of an enterprise ecosystem. Integral aspects include a deregulated financial industry, a mature stock exchange and a vibrant venture capital (VC) industry.

The stock exchange serves as an important source of capital for companies and investors. To serve its purposes, policies should ease listing and administrative requirements to make it easier for companies to raise capital. At the same time, they must ensure that regulatory checks, such as in the area of financial reporting, are in place such that quality is not compromised and investors are protected.

The vibrancy of the VC industry depends in part on the profile of the venture capitalists, i.e. whether there is a good mix of ex-entrepreneurs, business operators and ex-financiers, as each looks at different aspects of the business. The venture capital industry in Sweden is a melting pot with a

variety of players catering to different needs: business angels who often work behind the scenes; senior entrepreneurs who have left the board rooms of the old economy and entered into new partnerships with each other; new venture capitalists who form venture capital companies based on the classic model; and foreign capital interests investing in the Swedish market. The experiences of several European countries indicates that the best way to encourage greater corporate venturing is not so much to institute new programs but to reduce the tax and regulatory barriers, as these are the main obstacles to the corporate venturing scene.

4.3.3 Developing a Skilled Workforce and a Critical Mass of Talent

This strategic thrust deals with two important aspects: (a) developing a professional workforce skilled in ICT and knowledge management; and (b) building a critical mass of engineers, investment bankers, financial analysts, accountants and lawyers, as each plays a vital role in the innovation process. This is important because, unless countries develop the human expertise needed to manage knowledge, they will lose their strong competitive edge as their proven business models will not continue indefinitely.

Let us take an example from outside Europe where a comprehensive program was developed to increase the pool of ICT-savvy human resources. In Singapore, an *Infocomm Training Framework* was established in June 2001 to improve the ICT competence of the professional working community. The infocomm training needs of professionals are sieved into three levels of programs (see Figure 5), namely

(a) the ***E-Business Savvy*** *program*, which offers classes catering specially to executives, managers and operators of SMEs *outside* the infocomm industry;
(b) ***Conversion*** *programs*, to grow infocomm manpower in strategic infocomm industries, such as the *Strategic Manpower Conversion Program in Infocomm*, and the *Strategic Manpower Conversion Program in E-Learning*, designed to train a pool of skilled manpower for the e-learning industry, specifically in the area of instructional design; and
(c) ***Infocomm Specialization*** *programs*, targeted at infocomm professionals, such as the *Critical Infocomm Technology Resource Program* to provide training in the areas of e-commerce, infocomm convergence, project management and business management, and

the *Specialist Manpower Program* to provide training in the areas of telecommunications, wireless communications, software development and networking. Training in innovation strategy, transfer and marketing is also provided for leaders of established SMEs through the existing Initiatives in New Technology (INTECH) scheme.

Similar frameworks have been developed throughout the European Union, but rarely in the same comprehensive manner as described above.

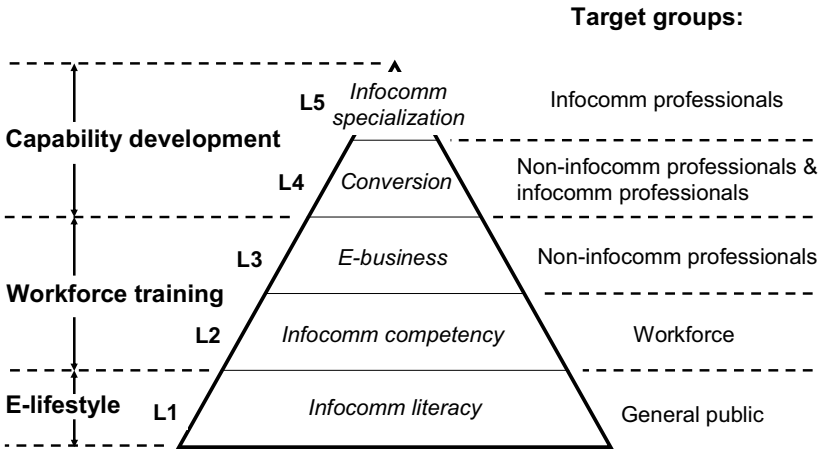

Fig. 5: Infocomm Training Framework (ITF) in Singapore

4.3.4 Regulatory Framework

A strict and enforceable regulatory framework is an essential pillar of the information society. As deregulation and liberalization become the buzzwords for the new economy, a good balance between the regulator's dual roles – i.e. to encourage greater technology and knowledge-intensive activities while ensuring that industry players play by the rules – becomes more important than ever. Two main aspects of this are discussed here, namely the creation of a strong and independent regulatory body for the telecommunications industry, and the need to institutionalize a regulatory framework for the knowledge and e-commerce industry, focusing on intellectual property protection, the reliability of electronic signatures and re-

cords, and the international compatibility of national laws governing electronic commerce.

A regulatory body for the ICT industry that is separate and distinct from the government is important to prevent a conflict of interests and to carry out "pro-competitive" reforms.

To enable the healthy development of the knowledge and e-commerce industry, the government has a role to play in regulating the industry. According to the International Chamber of Commerce, governments should concentrate on the areas they alone can handle, namely in providing a clear legal framework, law enforcement, intellectual property protection, healthy competition policy rules and a level international playing field[14]. With the use of ICT, new business models and methods are generated every day whose ideas become more abstract and conceptual. At the same time, the use of Internet domain names as source identifiers has rapidly achieved popularity. The realization that the misuse of a domain name could significantly infringe, dilute, and weaken valuable trademark rights has thus led to the need to attribute intellectual property rights to them[15]. The protection of such intellectual property is still relatively new. But it is important that governments recognize the significance of what is at stake.

In regulating the authentication of electronic signatures and records, countries have generally adopted one of three approaches: the *minimalist* approach, which focuses mainly on the removal of existing legal obstacles; the *prescriptive* approach, which prescribes a specific protocol or technology; or a *synthesis* of the two, i.e. a "two-tier" approach. Because of these divergent approaches adopted by different countries, policy-makers should, as far as possible, take steps to ensure that they are internationally compatible and coordinated. Ill-coordinated government regulation is perhaps the single biggest obstacle to the development of the e-business and knowledge industry. Because internationally incompatible national laws will ultimately cause a fragmented global market, they may rob the Internet of its instant global reach, which is its most precious asset. Therefore, the Internet Law and Policy Forum has devised a set of International Consensus Principles on Electronic Authentication. These principles are as follows: (a) Remove legal barriers to electronic authentication. (b) Respect freedom of contract and parties' ability to set provisions by agreement. (c)

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[14] International Herald Tribune (IHT) (2001),"Keeping E-Commerce Regulation-Free", November 8.

[15] White House (1997), A Framework for Global Electronic Commerce, The White House, July 1, see http://www.ecommerce.gov/framewrk.htm.

Make laws governing electronic authentication consistent across jurisdictions. (d) Avoid discrimination and the erection of non-tariff barriers. (e) Allow the use of current and future means of electronic authentication. (f) Promote market-driven standards. Adopting standards in these areas will thus cut common ground and create a predictable legal environment for the further development of e-commerce.

4.3.5 Creative, Innovative and Entrepreneurial Culture

Innovation, creativity, and an entrepreneurial spirit are essential ingredients to generate sustained growth in the knowledge-based economy. Societies based on innovation attach high priority to creativity (in the form of new ideas, concepts, knowledge, theories and business models). They also make full use of the creative talents in individuals organized in networks to come up with new ideas for technologies, products, systems and businesses. The importance of an environment that encourages creativity and innovation in the knowledge-based economy cannot be overstated. Policies can focus on three main areas: (a) reducing the social stigma of failure; (b) assisting the entrepreneurial and innovative process; and (c) rewarding creative, innovative and entrepreneurial behavior through awards and role models.

To encourage more entrepreneurial and innovative pursuits, an important step is to alleviate the social stigma attached to failure. No amount of policies can help if people are not willing to take risks. This is one of the most difficult areas, as it requires a shift in mindsets and a willingness to accept failure as part of the learning process. The government can play a role by revising institutional arrangements and regulations. Several European governments have adapted their bankruptcy laws to create a climate where business failures need not result in bankruptcy, and where those who become bankrupt through misfortune are treated differently to those who go bankrupt through mismanagement.

One area where governments can play an effective role is to reward creative, innovative, and entrepreneurial behavior in the private sector. As far as possible, make it known to the public that innovation and invention is a good thing. This can be done by creating role models and giving prestigious awards at all levels to reward such behavior. The *e*Europe Awards program discussed earlier is a good example of such a program.

4.3.6 Strategic International Partnerships

Finally, in today's information society, countries have increasingly forged value-adding partnerships with other knowledge-intensive countries that possess complementary capabilities. This creates synergies and enables national innovation programs to take full advantage of the global innovation system. Besides individual countries' *bilateral* cooperation with one another, international collaboration can also be *multilateral*. One example is the recent establishment of the Digital Opportunity Task Force (DOT Force) by the G8 countries to help developing and emerging economies in embracing ICT.

One country that has stood out in this area is Israel. Israel has developed rapidly as a high-tech powerhouse, and the formation of international partnerships has played an important role in its development. As expressed by the Israeli Ministry of Science, international partnerships should display the following traits: (a) steady, working relationships with countries that are leaders in the science and technology arena; (b) access to special (mostly very expensive) technology that is not available in Israel; and (c) access to foreign funding sources. Over the years, strategic partnerships have been developed with a host of leading industrialized countries such as Canada, the European Union (EU), Germany, Singapore and the United States. The *U.S.-Israeli Bilateral Industrial R&D* (BIRD) initiative is the first and most prominent bilateral initiative that Israel has formed with another country. Since its inception in 1977, its success and popularity has stimulated a number of similar bilateral initiatives with, for instance, Germany in 1986 (the *German-Israeli Foundation for Scientific R&D*), Canada in 1993 (the *Canada-Israel Industrial R&D Foundation*), and Singapore in 1997 (the *Singapore-Israel Industrial R&D Foundation*).

Israel was also the first non-European country accepted as an Associate Member of the EU Framework Program. The EU Framework Programs emphasize "pre-competitive research", whose definition closely coincides with the "strategic (or generic-strategic) research" that is the cornerstone of the current efforts of the Israeli Ministry of Science. Collaboration allows Israeli research entities in academia and industry to apply for the projects funded under the program on the same basis as legal entities in member states. Other than the provision of funds with ownership of intellectual property rights (IPR) and no payback, potential leverage also exists in the form of new technology, market intelligence and entry to new markets. Other forms of Israeli-EU collaboration also include participation in the EUREKA European network for market-oriented R&D, the Israeli Innova-

tion Relay Center (IRC), and the German-Israeli Cooperation in Science and Technology Programs.

Another common form of international collaboration is the establishment of physical information centers in partnering countries. Examples include the nine *Euro Info Centers* (EICs) in Sweden to provide companies with local access to a range of specialist information and advisory services, as well as direct links to the European Commission in Brussels and a business support network comprising 240 EICs across Europe, plus 19 Euro Info Correspondence Centers in Central and Eastern European countries and around the Mediterranean. The EIC network thus serves as "first-stop shops" for Swedish companies to obtain information and advice on business and EU matters.

4.3.7 Where to Go From Here

By examining the policies implemented by leading innovative countries in these strategic areas, the six-pronged strategy illustrated in figure 4 provides a systematic approach to fostering technological innovation in the private sector. Due to each country's limited resources and unique conditions, the important issue for policy-makers is to first identify, in their own countries, barriers to technological innovation in the private sector. Strengths should be further reinforced and international collaboration actively pursued with countries that possess complementary capabilities to improve in areas of weakness. This framework should thus enable policy-makers to take stock of where their country stands in the global innovation process and guide them in designing new innovation policies and evaluating existing ones.

4.4 Building an All-Inclusive Information Society

To exploit the full benefits of ICT in communication, innovation and learning, citizens – the *change agents* – must first be willing and able to use ICT. One critical pillar of government innovation policies is therefore to equip people by first increasing their access to ICT and encouraging citizens to use them creatively in their learning and communication process. In this section, we look at what the government in Singapore has done to build an all-inclusive information society. Other chapters in this book analyze in much more detail some aspects of what we call the inclusive information society but what others refer to as the digital divide. We will

also briefly outline some important regulatory issues as ICT becomes a way of life.

The strategy of developing an all-inclusive information society is to first transform non-ICT users into passive ICT users by providing greater access to ICT and skills training, followed by measures to transform them into active ICT users for whom ICT becomes a way of life (see figure 6). This is the vision of the Swedish Technology Foresight Project, which describes a future scenario where the boundaries between work, education and leisure become less clear, and more people are engaged in knowledge-intensive activities[16]. ICT can be used to tailor education and existing knowledge to the needs of the individual and, thereby, to support the process of life-long learning.

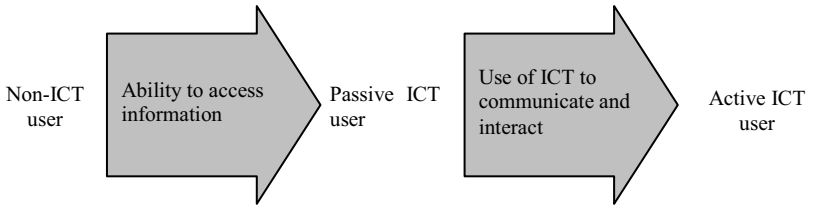

Fig. 6: Building an all-inclusive information society

4.4.1 Ability to Access Information

Policies to enable greater access to information through ICT involve (1) making ICT products and services more affordable, (2) making ICT hardware and support infrastructures more widely available, and (3) applying ICT in education and training programs.

4.4.1.1 Affordability of ICT Products and Services

One barrier to citizens' access to ICT may be the high cost of access and the expense of ICT products and services. High communication costs re-

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[16] Ministry of Industry, Employment, and Communications (Regeringskansliet) (2000), *An Information Society For All: A Publication for the Swedish IT Policy*, December, http://www.naring.regeringen.se/pressinfo/infomaterial/pdf/n2000_57.pdf.

main a major obstacle to the widespread use of the Internet. Although this is not the *only* factor, countries with relatively inexpensive Internet access do tend to have a higher Internet host density. The data from the extensive study reproduced in the eEurope 2005 index very clearly shows that there is a definite relationship between communication costs and Internet usage.

According to the Ministry of Transport and Communications in Finland, the most important factor influencing the price of mobile telephony is the level of competition[17]. Therefore, to make ICT products and services more affordable, policy-makers can actively liberalize the ICT industry to enhance greater competition. Finland has indeed been at the forefront in liberalizing the telecommunications industry, as evidenced in its Telecommunications Market Act. For example, by stating that third-generation (3G) mobile operators were allowed to roam on GSM networks on terms defined by the authorities, the law prevented existing operators from abusing their strong market position to hamper the business of 3G operators that did not have their own GSM networks. Similarly, in several European countries, providers of basic public telecommunication services are required to work with all IASPs in a non-discriminatory and non-exclusive manner, to prevent them from leveraging existing relationships with telco parents and engaging in anti-competitive practices. Over time, these measures, which are aimed at increasing competitive market forces in the ICT industry, will lower the cost of access and hence make ICT more affordable to the general population.

4.4.1.2 Availability of ICT Hardware and Support Infrastructures

To make ICT hardware and services more widely available, the strategy adopted by Singapore, Finland and Sweden is to locate them in easily accessible places. In Finland, public libraries are heavily frequented. Therefore, as part of the strategy, 80 percent of public libraries have access to the Internet. These public libraries are being developed into learning centers where users will have extensive computer hardware, information search facilities, printed and electronic information resources, workspaces, expert guidance and information services at their disposal.

To support the creation of an efficient and appropriate infrastructure for information transfer in education, the Foundation for Knowledge and Competence Development has given a total of around SEK 250 million to al-

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[17] Ministry of Transport and Communications (2001), *Economic Effects of Mobile Telecommunications in Finland*, February 1, http://www.mintc.fi.

most all universities and colleges to promote the broad use of ICT. Colleges and universities will serve as engines in the expansion of IT-based regional interactive networks that cover colleges, SMEs and high schools. This is part of the strategy of transforming Swedish students into leading ICT users and thereby to establish the country as a technology-savvy society. Edu.Stockholm, an advanced school data network introduced at the end of 2001 in the Stockholm region, provides 175 schools, 86,000 students, and 14,000 teachers with gigabyte access to a network.

4.4.1.3 Applying ICT in Education and Training Programs

It is critical for policy-makers to realize that making ICT more affordable and accessible is essential, but that it is not sufficient to encourage the broader use of ICT by citizens. These only constitute supply-side measures. To increase citizens' demand for ICT, however, they must be taught the skills to use this technology. To enable all citizens to have a basic level of ICT competence, policy initiatives are mainly targeted at three levels: (a) ICT in schools; (b) equipping senior citizens with basic ICT skills; and (c) raising the ICT competency of the general workforce through training.

(a) ICT in Schools

National ICT programs for schools have increasingly focused on providing schools with computers and Internet access, and equipping teachers with the skills to use ICT as an educational tool. The Swedish National Action Plan for IT in Schools, for example, is the most extensive investment in the use of ICT in Swedish schools. Aimed at stimulating the use of ICT as an educational tool in primary and secondary education across municipalities, this government initiative is installing computers on a wide scale in public schools. Teachers are being trained in how ICT can be used to its fullest potential as an educational tool. State grants are also provided to increase schools' Internet access, provide e-mail addresses to all teachers and students, develop the Swedish and European Schoolnet (showing teachers how they can integrate ICT in their teaching), and design special IT programs for students with disabilities.

(b) Equipping Senior Citizens with Basic ICT Skills

In Sweden, one-fifth of the surfing population, and also the fastest-growing Internet user group, is aged 50 to 79. These figures signal the success of SeniorNet, a national non-profit organization aimed at facilitating

the use of IT among adults aged 55 and above, and to introduce them to the available opportunities. The aim of the association is to enhance the quality of life of this target group by using the opportunities afforded by Internet use to prevent generational and social divisions and isolation. Activities conducted by SeniorNet Sweden include a website where senior citizens can share their experience, a short SeniorNet introduction course on IT and the Internet (so far attended by a total of around 35,000 senior citizens), and SeniorSurf Sweden, an event organized for the first time in September 1999, where more than 30,000 senior citizens visited some 350 participating libraries that are staffed with librarians and tutors to help them surf the Internet.

In many European countries, such as Belgium, France and the Netherlands, senior citizens are currently the fastest-growing group of ICT users. This was already the case in northern Europe in the late 1990s and the early part of this decade. Now, however, the trend has become pervasive throughout Western Europe.

(c) ICT Training for the General Workforce

Taking students, senior citizens and the workforce as a whole, probably the greatest challenge to policy-makers today is to raise the IT competency of the general workforce – especially those who do not need to use ICT in their work. Irrelevance and the lack of time and any real incentive to do so is often the largest obstacle to government initiatives in this area. To alleviate this problem, government agencies can collaborate with private-sector firms to: (a) provide a central source of information on ICT training programs; (b) provide financial incentives to encourage more private-sector firms to train their staff; (c) facilitate greater exchanges of information between high-tech firms and the education and training community in order to develop more appropriate programs that meet the needs of industry; and (d) make training more accessible to workers. Collaboration will be most successful when employers clearly define and communicate their requirements, employees have an up-front stake in learning new skills and training providers are attuned to market demand.

To make training programs more accessible to the workforce, existing worker training programs should be tailored for convenience. This will entail more evening classes, weekend classes and distance learning, as well as skills taught on a job-specific, on-site and just-in-time basis. To encourage more employers to invest in computers for their staff, one of the initiatives implemented by the Swedish government is to give special tax reduc-

tions to all companies that supply employees with personal computers, regardless of whether these are required for their work. Under recent tax reforms, benefits reaped by employees from using company computer equipment for private use are also tax-exempt.

4.4.2 ICT as a Means of Communication and Interaction

More important than having access to ICT is the ability to use it creatively to communicate and enhance learning. The trend in education today is shifting away from books and classroom-based teaching toward a greater focus on customized teaching, hands-on experience, and outdoor teaching in the form of field trips, internships, science exploration programs, and so on. All of these methods have the potential to be empowered by ICT.

As ICT becomes a way of life, issues pertaining to the protection of privacy and ownership of information in the information society will become more relevant and crucial. Like a new business model where the do's and don'ts are not yet clearly defined, policy-makers will have to strike a delicate balance between encouraging citizens and businesses to make use of ICT while ensuring that institutional capabilities and legislative checks are in place to minimize the inherent risks.

However, as the 9/11 terrorist attacks have shown, the ability to protect private information that flows over the Internet may be abused by specific interest groups. The attacks demonstrated the potential dangers in a "borderless" information society – especially the shift of power away from traditional sources toward those who have access to ICT and possess the skills to exploit it. Regulatory issues such as these will represent one of the most sensitive trade-offs in public policy in the next few years.

Another important regulatory issue in the information society is the control and ownership of personal information. With advanced ICT, personal data nowadays can easily be converted into "public" information that can be exchanged, bought or sold for secondary use without the originator's knowledge or consent. The growing challenge for regulators is to institutionalize a legal framework that makes the "middleman" legally liable for disseminating personal information to third parties without prior consent from the originator of the information.

4.5 Conclusion

Recognizing the critical role of technological innovation and knowledge management for sustained growth and wealth creation in the digital economy, European policy-makers have attached increasing importance to the use and diffusion of ICT on a wide scale. The data provided in this book shows that European governments have achieved very different levels of e-readiness, and that all of them still have a long way to go.

Public policy must increasingly focus on stimulating broad-based demand for ICT, facilitating technological innovation on a broad scale and creating an all-inclusive information society in which no-one is left out. Since governments have the largest client base, the public sector can play an important catalytic role by demonstrating the extra value that ICT can add to existing relationships with the government. This can create a "market" for ICT applications developed by the private sector, strengthening the growth of the ICT industry.

To facilitate technological innovation on a broad scale, policy-makers should concentrate on developing the enabling structures and links that can apply to all agents in the innovation process. Countries should focus on developing their strengths, while actively tapping into the global innovation system to share knowledge by forging international alliances in S&T. Finally, since the rate at which the use of new and existing technologies can lead to broad-based productivity gains depends on the development of human capital, public policy should focus on making ICT more affordable and accessible to *all* citizens, and on giving everyone the skills to participate in the information society. Progress toward the information society creates new risks. European policy-makers must therefore pay closer attention to ICT-related issues such as privacy, the ownership of information and the shift in the power base from traditional sources to those who have access to ICT and possess the skills to exploit it.

This chapter provides a framework and highlights "best practices" that show what governments can achieve in the digital economy. The balanced approach emphasized herein is designed to give readers a helpful resource and guiding framework so that governments can systematically evaluate their policies and plot their next stage of development toward an e-Europe. In light of limited resources, governments should carefully weigh the needs of businesses and their citizens, implementing those strategies that will add most value for both and thereby exploiting the strengths of each economy to the full.